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# Physical fitness changes induced by thermal aquatic standardized exercise in chronic venous disease patients

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## Abstract

**Background:** Lack of physical activity represents a risk factor for both cardiovascular and chronic venous diseases (CVD), nevertheless a specific exercise protocol for CVD patient is still missing. This investigation was aimed to assess the impact of a standardized exercise protocol in a thermal water environment on physical fitness and quality-of-life (QoL) in CVD patients.

**Methods:** Sixteen (16) CVD patients performed 5 standardized exercise sessions in a thermal water pool. Before starting the exercise protocol, the cohort filled International Physical Activity Questionnaire (IPAQ) to determine their physical activity level. At baseline and at the end of the exercise program, leg volume, QoL, musculoskeletal and cardiovascular physical fitness were assessed by means of water plethysmography, validated questionnaire and functional test, blood pressure and heart rate at rest were also reported.

**Results:** All the patients were categorized as physically inactive: average activity time 235.6 (155.2) MET-minutes per week. At the end of the study, a significant leg volume reduction was found (-16%;  $p < .002$ ). Significant improvement in lower limb strength ( $p < .0001$ ), endurance ( $p < .006$ ), rapidity and balance ( $p < .05$ ) together with decrease in resting heart rate (-1.8%,  $p < .0001$ ) and systolic blood pressure (-1.1%,  $p < .04$ ) were reported, significant improvement in bodily pain ( $p < .0005$ ) and social function ( $p < .002$ ) QoL items were observed.

**Conclusions:** The proposed exercise protocol in thermal aquatic environment demonstrated to be an effective treatment modality improving both cardiovascular and musculoskeletal outcomes and QoL in sedentary CVD patients. Aquatic environment investigations require proper analysis of the various factors involved, in a standardized and reproducible way. The herein report can be a reference for further studies on different health related conditions.

**Keywords:** Chronic venous disease; aquatic exercise; exercise therapy; oedema; physical activity; thermal water; water training.

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